USSN 09/661,429
Art Unit 2815

In the claims:

Please amend the claims as follows:

1. (currently amended) A tunable laser system comprising:

a laser diode for generating laser light ~~with~~ from an active region comprising a multitude of self-assembled low dimensional quantum structures organized collectively to have an emission and gain spectrum extending continuously over a wavelength range of at least one hundred~~s of~~ nanometers, said quantum structures being selected from the group consisting of quantum dots and quantum wires;

a wavelength-selective element for selecting a wavelength of interest emitted by said laser diode; and

an external cavity resonant at a wavelength selected by said wavelength-selective element so that the active region of said ~~system~~ laser diode generates said laser light at said selected wavelength.

2.(original) The laser system of claim 1, wherein said low dimensional quantum structures are zero-dimensional or quasi-zero-dimensional (quantum dot) structures.

3.(original) The laser system of claim 1, wherein said low dimensional quantum structures are one-dimensional (quantum wire) structures.

4.(original) The laser system of claim 3, wherein said one-dimensional or quasi-one-dimensional structures are obtained with coupled zero-dimensional structures.

5.(previously amended) The laser system of claim 1, wherein said low-dimensional structures are quantum dots obtained by spontaneous island formation during epitaxy of highly strained semiconductors.

6. (previously amended) The laser system of claim 5, further comprising a wetting layer underneath said low dimensional structures arranged such that energy levels in said low dimensional structures lie below a subband in said wetting layer.

7. (previously amended) The laser system of claim 6, wherein all or a part of the spectral region comprised between the emission of the said wetting layer and the emission of the lowest energy low-dimensional level is tunable for lasing by selecting a parameter

selected from the group consisting of: parameters which control the level of saturation or the optical gain.

8.(original) The laser system of claim 7, wherein said laser diode further comprises an electron emitting layer, a hole emitting layer, a series of quantum dot layers in an active region disposed between said electron and hole emitting layers, barrier layers separating each quantum dot layer, and wherein intermediate layers between the said active region and the said electron and hole emitting layers are provided to tailor the optical and electrical properties of the low dimensionality laser diode to specific requirements.

9.(original) The laser system of claim 8, wherein said layers forming the laser diode consist mainly of gallium, indium, aluminum, arsenic, nitrogen, and phosphorus.

10.(original) The laser system of claim 8, wherein said layers forming the laser diode consist essentially of $Al_{x3(1-x2)}Ga_{(1-x3)(1-x2)}In_{x2}As_{1-x1}P_{x1}$ for the electron and hole emitting layers, $Al_{x6(1-x5)}Ga_{(1-x6)(1-x5)}In_{x5}As_{1-x4}P_{x4}$ for the active region, and $Al_{x9(1-x8)}Ga_{(1-x9)(1-x8)}In_{x8}As_{1-x7}P_{x7}$ for the barrier layers.

11.(original) The laser system of claim 10, wherein the layers are grown on a GaAs substrate, and where x1 and x2 equal about 0, x3 equals between 0.3 to 0.8; x4 and x6 equal about 0, x5 equals between 0.3 and 1; x9 equals between 0 to 0.3, and x7 and x8 equals about 0.

12.(original) The laser system of claim 10, wherein the layers are grown on GaAs substrates, and where x1 and x2 equal about 0, x3 equals between 0.3 to 0.8; x4 equals about 0, x6 equals about 1, x5 equals between 0.4 and 1; x9 equals between 0.1 to 0.4, and x7 and x8 equal about 0.

13.(original) The laser system of claim 10, wherein the layers are grown on GaAs substrates, where x3 equals about 0, x1 equals about 1, and x2 is such that this alloy is close to being lattice-matched to GaAs, x4 and x6 equal about 0, x5 equals between 0.3 and 1; x7, x8, and x9 equal about 0.

14.(original) The laser system of claim 10, wherein the layers are grown on GaAs substrates, where x3 equals about 0, x1 equals about 1, and x2 is such that this alloy is close to being lattice-matched to GaAs, x4 and x5 equal about 1, x6 equals about 0; x9

equal about 0, and x7 and x8 are such that this alloy is close to being lattice-matched to GaAs.

15.(original) The laser system of claim 10, wherein the layers are grown on InP substrates, where x1 equals about 0, x2 equals about 0.52, x3 equals about 1; x4 and x6 equal about 0, x5 equals between 0.6 and 1; x9 equals between 0 to 0.5, x7 equals about 0, and x8 equal about 0.52.

16.(original) The laser system of claim 10, wherein the layers are grown on InP substrates, where x1 equals about 0, x2 equals about 0.52, x3 equals about 1; x4 and x6 equal about 0, x5 equals between 0.6 and 1; x7, x8 and x9 are adjusted to form a quaternary alloy close to lattice-matched on InP with the desired bandgap.

17.(original) The laser system of claim 10, where said wavelength-selective element used to tune the laser output consists of an element selected from the group consisting of: a diffraction grating, a prism, a birefringent element, an etalon, and a dispersive element.

18.(original) The laser system of claim 17, wherein said external cavity is defined between a pair of mirrors with appropriate reflectance, and said wavelength-selective element acts as an output-coupler of light from said laser diode into said external cavity.

19.(original) The laser system of claim 18, wherein one or more of said mirrors is selected from a group consisting of: a facet of said laser diode, or the wavelength-selective element which can also act as an output coupler.

20.(original) The laser system of claim 18, further comprising optical and spatial filters in said external cavity.